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Lord Wrottesley, Vice-President, in the chair.

Frederick Walter Simms, Esq. F.G.S., Civil Engineer, of Hythe, Kent, was balloted for, and duly elected a Fellow of the Society.

The following communications were read:—

I. Some remarks on the Telescopic Appearance of the Moon, accompanying a Model and a Drawing of a Portion of her Surface. By James Nasmyth, Esq.

The model and drawing submitted to the Society by the Author, represent a portion of the moon's surface of 190 by 160 miles, situated in the upper part of her left limb as seen in an inverting telescope, having in the centre the large crater marked in the Berlin chart No. 29, and named "Maurolicus."

The scale of the drawing is one-eighth of an inch to a mile. The telescopes employed were two Newtonian reflectors, one of 8¾ inches aperture, and 9 feet focal length, and the other of 12 inches aperture, and 13 feet focal length, the powers employed being 240 and 360. The author has, for the last four years, confined his attention almost exclusively to the nature and structure of the lunar disc, and he selected the portion above mentioned as a subject for a model by reason of its comprising in a small space most of the chief features which so remarkably distinguish her surface.

The model was constructed with a view of illustrating the close relationship which appears to exist between the structure of the lunar surface and that of a considerable portion of the earth, in regard to the similarity in the results of vast volcanic action.

The author, in reference to the nature of the peculiarities of the surface of the moon, first remarks on the *vast size* of the lunar craters as compared with those on the surface of the earth. Of these there exist some of the enormous magnitude of 150 miles in diameter, besides other circular formations, such as the "Mare Serenitatis," and "Mare Crisium," which are from 200 to 300 miles in diameter, and which evidently owe their form to volcanic action of prodigious central energy. This enormous effect, compared with that of volcanic agency on the earth's surface, will appear less surprising when we consider that the mass of the moon is scarcely the $\frac{1}{70}$th part of that of the earth, and that, consequently, the weight

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of the materials acted on by the volcanic force is diminished very considerably compared with bodies on the earth's surface: the probable want of atmospheric resistance will also assist in accounting for the immensely greater effects produced. The beautiful and almost perfectly circular form of the majority of the lunar craters may be due to the absence of wind or other disturbing causes, permitting the discharged materials to perform the course due to the impulse comparatively free from all impediment.

There are several portions of the moon's surface which indicate that considerable *time* has elapsed between the formation of one crater and that of another, this being proved by the fact of the circular mound of the one overlaying that of the other. [The author here introduces a pen sketch illustrating this remark.]

Next to the circular form of the craters, the author considers that there is no feature more striking than the small cones or mounds which we observe in the centre of most of the craters. These he considers to be the result of the last expiring efforts of the volcanic action, as we find it to be the case in Vesuvius and other terrestrial volcanoes. Other cases exist in which there is no such central cone; but these may have resulted from the more sudden termination of the volcanic action which had permitted the fluid sooner to float across the bottom of the crater, and to form that plain, smooth surface which may be seen in a few cases. One has been, however, observed by the author in the upper part of the right limb of the moon, in which the lava had apparently kept flowing up so gently to the last as to leave the crater brim-full. [This is illustrated by a pen drawing.] The ruts or channels which may be distinctly observed in the sides or banks of the outside circular mounds, and which frequently extend to a considerable distance, prove that the matter discharged has not been entirely of a solid nature. Blocks of solid materials also appear to have been discharged with vast force and in vast quantity. They may, in many cases, be observed lying about the bases of the larger craters, where the surface is rendered quite rough by the quantity of such detached fragments.

The last peculiarity adverted to by the author consists in the bright lines which generally converge to a centre, and in which we frequently find a crater of very considerable magnitude. "Tycho," "Copernicus," and "Kepler," are remarkable examples of this appearance. The material of these bright lines is evidently of a much more reflective nature than the contiguous or general surface of the moon, and, in most cases, the interior of the crater to which they converge is equally resplendent. The author considers them to be derived from the same original cause which produced the central volcano from which they appear to diverge. It appears to him that they are produced by the flow of the molten lava through the vast cracks resulting from the great primary upheaving action which had burst upwards the solid surface of the moon, cracking it as a pane of glass does when broken by any pointed object. The centre of disruption has evidently been under the great central volcano. The cracks have diverged on all sides from this centre of action; and the molten lava immediately flowing up would come forth in greatest quantity from the centre, and there result in and produce the great crater, while the radiating cracks would yield smaller portions *simultaneously* all along their course, however extended.

II. Observations of the Solar Eclipse of 1843, December 21, made at the Observatory of Trevandrum. By John Caldecott, Esq.

The account of the eclipse is communicated in a letter to Mr. Baily, dated February 21, but was unfortunately too late for the mail of that month. Mr. Caldecott having satisfied himself that the eclipse would be total, in latitude 11° 45′ north, and longitude $5^h\ 3^m$ east, determined on proceeding to the neighbourhood of Tellicherry (on the coast), for the purpose of observing it. It was necessary to be very precise in this calculation, and also to be very certain of the geographical position of the spot selected for observing the eclipse, on account of the almost exact correspondence in size of the sun's and the moon's discs. Mr. Caldecott, in the first place, proceeded by sea to Mahe (a little to the south of Tellicherry), and thence up the Mahe river towards its source, and having, by a careful survey of the river, ascertained its position with respect to Mahe (whose latitude and longitude he had previously ascertained), he selected a clear and open space on a rising ground, about three miles north of it, and there pitched his tent at midnight of December 20. He had brought with him an excellent 30-inch achromatic telescope, having an object glass of 2¾ inches aperture, with an eyepiece giving a magnifying power of about 50, protected by a smoked glass gradually increasing in intensity from one end to the other, and sliding easily in a groove, wherewith to observe the eclipse; a sextant and artificial horizon, with a good pocket watch for time; and two native assistants, with an actinometer for observing the rate of decrease of solar radiation.

At daylight on the 21st (civil reckoning), the author mounted his telescope on a stand having a very smooth parallactic motion, and made all the necessary preparations, taking a set of altitudes of the sun's lower limb at about 7^h A.M., and stationing the native observers at the actinometer. He began watching the point of the sun's disc, where the edge of the moon's limb was to impinge at $7^h\ 35^m$, the sky being at this time quite clear in every direction, with the exception of a few light fleecy clouds which hung about the sun, but which cleared away before the eclipse became total. The observations that follow were taken almost verbatim from the author's notes written during the progress of the eclipse. At $7^h\ 38^m\ 49^s$, corrected mean solar time, civil reckoning, the contact was evident, though the real first contact was probably two or three seconds earlier. With one digit eclipsed the border of the moon was fully as tremulous as that of the sun, and no hollows or coruscations were to be seen. No appearance of any *inherently* bright spots about the moon's disc was observed about this time,

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